View metadata, citation and similar papers at core.ac.uk
brought to you by CORE
provided by Carolina Digital Repository

The Trouble With Storms

Todd Miller and Jim Stephenson

As Hurricane Floyd buffeted the Bahamas on September 13, 1999, many North Carolinians were quietly wishing that the storm would head due west. But it didn't. After brushing by Florida, Georgia and South Carolina, Floyd came ashore near Wilmington, North Carolina, on September 15.

Eastern North Carolina was still soaked from a week long encounter with Hurricane Dennis that lingered off Cape Hatteras for days before making a return visit to the mainland at Cedar Island. By the time Hurricane Floyd rushed through the state, the rivers were already swollen and the soils saturated. There was nowhere for Floyd's waters to go.

Hurricane Floyd has been tagged the worst disaster in North Carolina history. Whole towns were inundated by flood waters carrying everything from gasoline and oil slicks to hog carcasses and caskets downstream. Rainwater that collected in the floodplains of the Tar, Neuse, and Roanoke rivers displaced, and in some places destroyed, the communities and industries in these fragile areas.

Along the coast, the barrier islands protected the mainland from Hurricane Floyd's wrath. Oak Island had the greatest structural damage from Floyd, with 50 homes and vacation properties destroyed or substantially damaged. Erosion on Core Banks, including Emerald Isle, Pine Knoll Shores and Atlantic Beach, caused the beach to migrate from 15 feet to 50 feet landward. On Emerald Isle, 157 homes are now imminently threatened. On Topsail, Surf City and North Topsail Islands, oceanfront dunes and berms built in the aftermath of Fran were washed away.

Flooded With Problems

As a result of Hurricanes Dennis and Floyd, pollutants from flooded wastewater treatment plants, inundated septic systems, engulfed hog lagoons, underwater junk yards, drifting propane and oil tanks, and chemicals leaching from flooded garages and industrial facilities were flushed into rivers, streams, and sounds. This polluted toxic soup was transported downstream where it was deposited into the estuaries of the Albemarle and Pamlico Sounds.

As the pollutants moved downstream, dissolved oxygen in the Pamlico and Neuse Rivers and Pamlico Sound dropped, and in some places became depleted. Han Paerl, a marine scientist at the University of North Carolina's marine lab, believes that fish probably fled the estuaries after Hurricane Dennis. One member of the North Carolina Coastal Resources Commission claims to have caught a catfish in the ocean shortly after Floyd.

Water quality deteriorated so dramatically during the storms that State Health Director Dennis McBride issued an advisory for people to

---

Todd Miller *is the Executive Director and Founder of the North Carolina Coastal Federation. He is a native of coastal North Carolina and holds a Masters Degree in City and Regional Planning from UNC-Chapel Hill.*

Jim Stephenson *is a Program Analyst at the North Carolina Coastal Federation, responsible for leading efforts in the areas of industrial development and environmental economics. Mr. Stephenson holds a Bachelor of Arts degree from Gettysburg College, PA.*

avoid contact with the water. People were advised to avoid contact that would expose eyes, ears, nose, mouth and any cuts or sores to floodwaters. Out on barrier islands, the surge combined with the rain to flood inland areas. Island towns pumped the stormwater into the ocean, contributing to water quality degradation that in one case caused six surfers to become ill after swimming off of Emerald Isle.

Dollars & Sense

When Hurricane Fran hit the North Carolina coast in September 1996, political officials claimed that they had learned some lessons. FEMA Director James Lee Witt told *The Raleigh News & Observer* that "If we're going to keep people out of harm's way and if we're going to cut costs from disasters, we're going to have to change the way we do business." The recovery from Hurricane Fran racked up a bill of $6 billion, including $211 million in FEMA public assistance grants and loans.

Among the expenditures after Fran was $4.6 million to erect a 4-foot high bank of sand extending 15 miles along the beach at Topsail Island. Those sand dunes were virtually wiped out during Floyd leaving wooden walkways arching over the now flattened beach. Federal money also went toward rebuilding beach houses, fishing piers and a high-rise hotel, further promoting development in vulnerable areas.

"Bad management decisions in 1996 will haunt us for generations to come," predicted Kevin Moody, a resource biologist with the U.S. Fish and Wildlife Service, which has responsibility for protecting the nests of endangered sea turtles. Moody spent several days surveying the damage on barrier islands following Hurricane Floyd. Moody surmised "I didn't see any damage that was purely because of Floyd. It was all because we decided not to take the appropriate action in 1996."

Since 1968, when the Federal Flood Insurance Program began, through 1997, FEMA estimates that one-third of the $8 billion in flood insurance payments went to property owners experiencing repeated losses. Now that entire towns have been devastated, the question is: How will these communities rebuild and where?

In an attempt to avoid repeating past mistakes, environmental organizations developed a set of principles for disaster relief which were sent to North Carolina's Congressional Delegation, Governor Hunt and state legislative leaders. The principles call for removing wastewater treatment plants, intensive livestock operations and junkyards from floodplains. Public funds should be used to relocate homes and businesses away from flood-prone areas. Instead of paying for the reconstruction of homes in high-risk portions of barrier islands, public funds should be used to acquire areas unsuitable for development (see Fig. 1).

Sand Dollars

Tucked away in this year's budget passed by the NC General Assembly is an unfunded mandate for the Department of Environment and Natural Resources to prepare a plan by May 1, 2001, to determine how to fund beach restoration projects in North Carolina.

Pressure to get the state more vested in these projects is coming from oceanfront towns and counties from the Outer Banks to Ocean Isle. Local governments are worried that along more than 160 miles of beach, the ocean may soon undermine homes, rental properties, hotels and condos, as well as the streets, highways and other utilities that service these seaside resorts. Mounting damages include eroding property values and declining incomes from rental properties and the tourism economy.

North Carolina knew decades ago that this "day of reckoning" for oceanfront properties was on the way. That is why it adopted formal regulatory policies for how best to respond to continuing and predictable shoreline migration. Land use planning, construction setbacks, building relocation, subdivision rules, management of vegetation, and pumping sand on beaches are preferred responses to erosion–so assert these state policies.

Based upon these regulatory principles, projects designed to respond to erosion should avoid losses to natural heritage and not adversely affect the productivity of our coastal and ocean waters. The public trust right to use the ocean beaches, including traditional recreational uses

such as walking, swimming, surf-fishing and commercial fishing, are to be preserved.

It is predictable that oceanfront communities would lobby for help in paying to put more sand on their beaches. For a while such projects can reduce property losses, and they hold out some hope for maintaining the "status quo," or even allowing more intense oceanfront development. But sea level is now rising at a projected rate of 1.7 feet per century, hurricanes and northeasters are now predicted to occur more frequently and at greater intensity, and there are chronic shortages of economical sources of sand along significant portions of our coast. All this means that the on going costs of drawing a line in the sand and attempting to hold the beaches where they are today will escalate until it is not technologically or economically feasible to do so.

Estimates of the average yearly cost of beach renourishment vary widely. These yearly estimates range from $350,000 to more than $3 million a mile. Using the lowest estimate, it will cost in excess of $56 million a year to do all the beach pumping now being sought by towns, counties and state agencies in North Carolina.

Most lawmakers and taxpayers resist such expenditures, especially those that are not financially connected to oceanfront property. There is little chance that the vast majority of taxpayers would willingly foot the bill for all the projects now being sought.

Future Shocks

The prognosis for weather patterns does not bode well for North Carolina's coastal region. In May, the US Department of Commerce's National Hurricane Center predicted that the 2000 hurricane season would be above average. This typically means 11 or more tropical storms, of which seven or more become hurricanes, with three or more classified as major. A major hurricane is classified as a Category 3 storm with winds surpassing 110 miles per hour. In 1999, there were 12 named storms, with five striking

Figure 1. Principles to Guide Disaster Relief to Reduce Future Damage and Protect the Environment

Remove Sources of Pollution from the 100-year Floodplain

- Repair and relocate as necessary waste treatment facilities.
- Do not rebuild or replace anaerobic lagoons for concentrated animal production facilities, but provide flexibility and incentives to use some public assistance for innovative technologies.
- Do not build or replace hog factories and other concentrated animal operations in the 100-year floodplain, in wetlands, or in prior converted wetlands.
- Relocate major pollution sources from the floodplain.

Reduce Subsidies of Risk

- Relocate homes and businesses in extreme flood-prone areas.
- Restrict development in high-risk portions of barrier islands and beaches.

Enhance our Natural Defenses Against Disaster

- Expand floodplain and wetland restoration programs.
- Restore buffers to reduce flooding and protect water quality.

Improve Future Planning

- Reassess floodplain delineation to determine the accuracy of current planning assumptions.
- Require local preparation of floodplain management plans.
- Assess status of residential drinking water wells and coordinate funding to relocate substandard wells.
- Coordinate the multiple sources of state and federal relief and infrastructure funding (such as FEMA, flood insurance, Clean Water Bonds, and FSA Emergency Loans) to assure that wise planning principles are consistently observed.

These principles were developed and agreed to by nine statewide and regional environmental organizations, including NCCF.

the mainland United States. While no one can predict the future, in eras when similar atmospheric conditions have been present, "75 percent of the Atlantic hurricane seasons featured above-average activity," according to the National Hurricane Center. The major unknowns are exactly where along the Atlantic Coast the two or three predicted tropical storms will hit and how strong they will be when they do.

The aftermath of an above average hurricane season could become a day of reckoning for beach towns and communities near the coast. Stan Riggs, a coastal geologist at East Carolina University, conjectures that the Outer Banks of North Carolina could break up and migrate rapidly toward the mainland in the next 10 to 20 years. Riggs claims it could take 10 years under above average storm activity, twenty years under normal storm activity as the result of sea level rise, or in just one year if a single Category 5 storm hit.

A report released this year by The Heinz Center projects that one in four homes within 500 feet of a U.S. coastline will fall into the water within the next 60 years as the result of sea level rise and storm activity. The Heinz Center studies seven counties along the Atlantic seaboard, including Dare and Brunswick in North Carolina. The study determined that in Nags Head in Dare County, five rows of homes could be lost to beach erosion over 60 years. At Holden Beach in Brunswick County, two rows of homes have already been lost to erosion.

Holden Beach, North Carolina
North Carolina Division of Emergency Management

What is clear from these studies and prognostications is that singular solutions like beach renourishment will not be enough to trick Mother Nature. Beach renourishment may provide some protection under a low-storm scenario, but nourished beaches are ill-equipped to counter the devastation that could be caused by an above average hurricane season. A multi-faceted response to erosion that includes enforced construction setbacks, relocating buildings back from the sea, property buyout programs, stronger subdivision rules, management of vegetation and meaningful land use planning is our only hope in dealing with the storms that are looming large on the horizon.

Proposed Elements of a Beach Restoration Plan for North Carolina

The State should base its new beach restoration strategy on its existing oceanfront policies, which require a multi-faceted response to beach migration. The North Carolina Coastal Federation supports these policies, and advocates carrying them out by evaluating the acceptability of all beach renourishment proposals based upon the response to the following concerns:

There must be acceptable and adequate sources of sand available. There should be suitable and sufficient sand available within an economical pumping or hauling distance to keep beach nourishment a viable alternative for at least 30 years. We know that cheap sand (i.e., high-quality sand close to the beaches) is not in plentiful supply along much of the NC coast. Mud, mud balls, and shell debris should not be allowed on any beaches, as has occurred with renourishment projects at Atlantic Beach.

The project must be properly planned, timed and executed. Proper planning, timing and execution of projects is essential to minimize unacceptable impacts to fisheries and endangered species. The "window of opportunity" each year when dredging can occur is small (normally November through March). That window can get even smaller in years when temperatures are unseasonably warm. Regulatory agencies must strictly enforce permit conditions on projects, even if that means starting a project later than

planned or stopping the project before it has been completed.

Adequate habitat and water quality monitoring must occur to evaluate effects on fisheries and water quality. It must be demonstrated that the mining and placement of sand on beaches has no unacceptable effects on fisheries and water quality. The scale of existing beach renourishment projects is small compared to new projects now contemplated. Because there has been so little study of the biological effects of beach renourishment, all new projects that are undertaken should include monitoring to prevent unacceptable effects on recreational and commercial fishery habitat. This includes on-going monitoring of the use of potential "borrow sites" as fish habitat to determine when dredging should be allowed to begin and when it must end. At least five percent of the project budget should be spent on monitoring activities.

Project planners must be completely forthcoming about the long-term costs of renourishment. Nobody knows for sure how long a beach renourishment project will last. Storms will ultimately claim much, if not all, of the added sand, and long-term storm prediction is very uncertain. Based on past experience, most beach nourishment projects on the Atlantic coast last less than five years. Planned projects should delineate the range of possible project costs based upon worst and best case scenarios.

The project must provide adequate public parking. The beach access public parking standards adopted by the North Carolina Coastal Resources Commission establish the minimum amount of public parking that should be provided as part of any publicly funded beach renourishment project. Communities that do not have this amount of public parking must provide it to become eligible for projects that are financed with state or federal tax dollars.

The project must include an "exit strategy" to deal with beachfront property when renourishment is no longer feasible due to insufficient funds, sand supplies, and/or future storm activity. The Coastal Resources Commission and local governments should adopt and enforce a beachfront building setback from the ocean for new construction based upon a factor that would protect houses and properties for 100 years. Counties and municipalities should not be eligible for state and federal funding unless they have land use plans and ordinances that actively discourage development of structures on beachfront property that cannot readily be moved. All local units of government should adopt a public disclosure ordinance requiring that potential buyers be fully informed about the erosion history of oceanfront properties and the anticipated future costs of nourishment. Each prospective buyer should also be given a copy of *Questions and Answers on: Purchasing Coastal Real Estate in North Carolina.* This well-written pamphlet was prepared through the North Carolina Sea Grant Program and provides unbiased information about beach erosion.

The project must be financed so that it places the burden on the people that benefit from renourishment. Public financing for beach renourishment should place the burden of paying for projects on the people who most benefit from them. The most obvious beneficiaries include oceanfront property owners and their guests. Primary sources of funding include special property tax districts, oceanfront lots and occupancy taxes. There should be taxation with representation by bringing the issue to a vote via public referendum, thereby giving citizens the opportunity to decide. CP